

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

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PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 31 AUGUST 2004 (31.08.2004)

Applicant's or agent's file reference

#216

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/KR2004/001092

International filing date (day/month/year)

12 MAY 2004 (12.05.2004)

Priority date(day/month/year)

01 DECEMBER 2003 (01.12.2003)

International Patent Classification (IPC) or both national classification and IPC

IPC7 H01L 21/31

Applicant

SOGANG UNIVERSITY CORPORATION et al

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/KR



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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/001092

Box No. 1 Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
☐ table(s) related to the sequence listing

b. format of material

- ☐ in written format
☐ in computer readable form

c. time of filing/furnishing

- ☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/KR2004/001092

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-7	YES
	Claims		NO
Inventive step (IS)	Claims	1-7	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-7	YES
	Claims		NO

2. Citations and explanations :

This statement is based on the claims 1 ~ 7 as originally filed.

The claimed invention relates to an ultra-low dielectric for copper interconnect. An ultra-low dielectric according to the present invention is formed by mixing a polyalkylsilsesquioxane copolymer and acetylcyclodextrin nano particles with a pore generating agent in an organic or inorganic solvent and then coating the mixture on a substrate.

The following documents have been cited in the International Search Report (ISR):

D1 : JP 12-328004 A(JSR Corp) 28 November 200

D2 : JP 8-143818 A(Showadenkokk Corp) 4 June 1996

D3 : US 6204202 B1(AlliedSignal Inc) 20 March 2001

D4 : 5-315319 A(Catalysts&Chemind Co., Ltd) 26 November 1993

D1 discloses a composition for forming film and material for forming film. A composition for forming film is obtained by hydrolyzing and/or condensing the components (R1)aSi(OR2)4-a and (R3)bSi(OR4)4-b under the presence of a catalyst and water in an organic solvent. Wherein R1, R2, R3, R4, a and b are each monovalent group selected from methyl, ethyl, vinyl and phenyl; monovalent group; 4 or more C straight chain alkyl, branched chain alkyl or alicyclic alkyl; monovalent organic group; 0-2; 1-2).

D2 discloses a composition for semiconductor insulation film, flattened film and formation of a film. A composition for semiconductor insulation film comprises (A) a polymethylsilsesquioxane, (B) an organic solvent soluble for the polymethylsilsesquioxane, and (C) a tetra-1-4C alkylammonium hydroxide at the weight ratios A/B of (2:98) to (50:50) and (A+B)/C of (1:3×10⁻⁵) to (1:1×10⁻⁸). A semiconductor insulation film or flattened film is formed by coating this composition on a semiconductor substrate followed by evaporating the organic solvent, and then curing the resultant coating film under heating at 200-500°C.

D3 discloses a low dielectric constant porous film. A porous film is prepared by a process of preparing a mixture of a spin-on-glass material with a suitable thermally degradable polymer that is soluble in polar solvents.

D4 discloses a semiconductor device having a silica dielectric and its manufacture. A silica dielectric contains a silica sol and polycondensation for alkoxy silane with this alkoxy silane or its partial hydrolytic substance.

None of the documents in the International Search Report (ISR), taken alone or in combination, discloses the special combination of features defined in the invention. Furthermore, in the ISR documents there are no suggestion leading a person skilled in the art towards the invention defined by the claims 1 ~ 7. There, the invention is novel, involves an inventive step, and has industrial applicability.